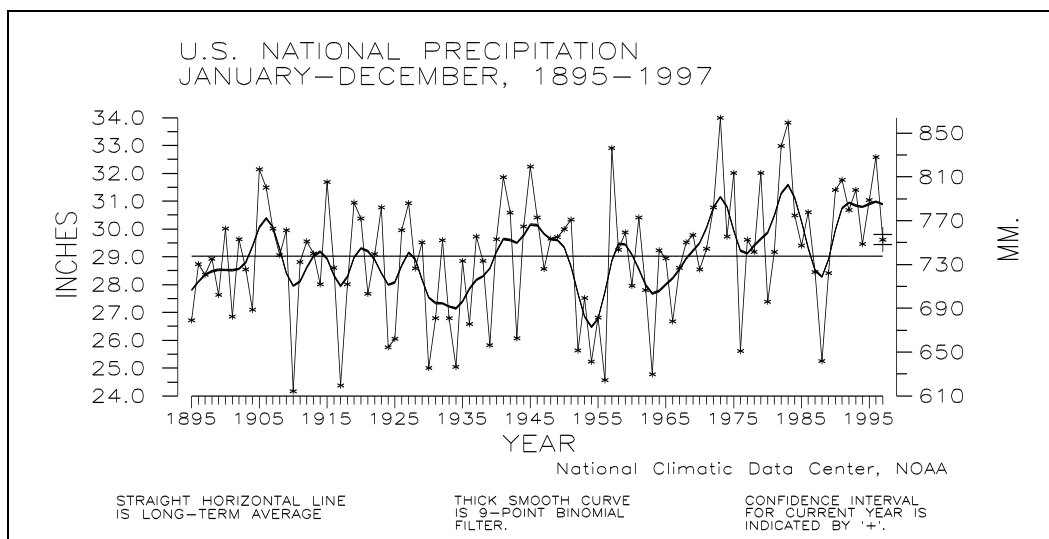
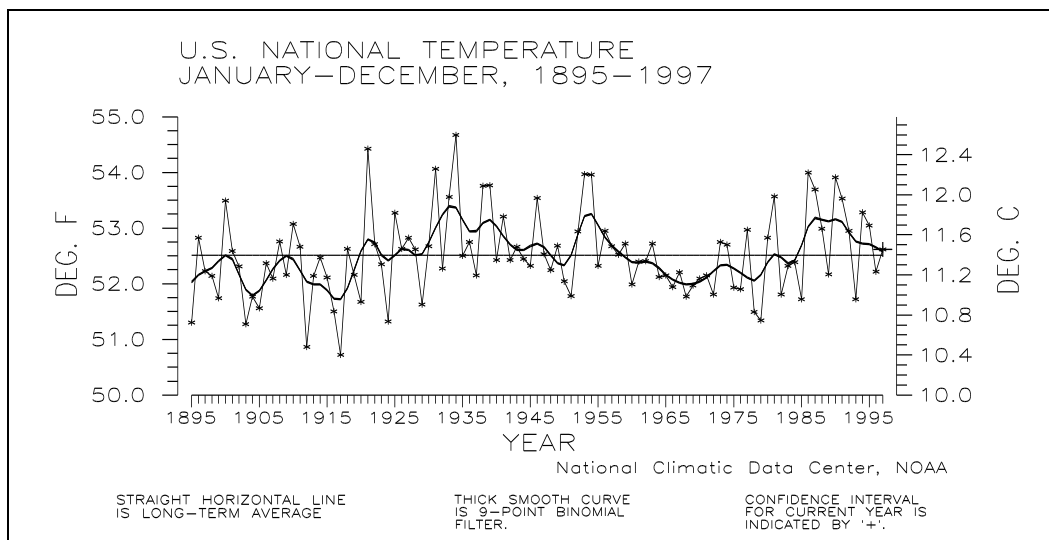


CLIMATE VARIATIONS BULLETIN



This CLIMATE VARIATIONS BULLETIN (CVB) is a preliminary report that puts current monthly climate anomalies into historical perspective using climate databases archived at the National Climatic Data Center (NCDC). It is issued on a monthly basis. Supplemental sections are included which address seasonal and annual perspectives, when appropriate.

Current data are based on preliminary reports from River Forecast Center stations and First and Second Order airport stations obtained from the National Weather Service (NWS) Climate Prediction Center and preliminary tornado statistics obtained from the NWS National Severe Storms Forecast Center. THE CURRENT DATA SHOULD BE USED WITH CAUTION. These preliminary data are useful for estimating how current anomalies compare to the historical record, however the actual values and rankings for the current year will change as the final data arrive at NCDC and are processed.

The following NCDC datasets are used for the historical data: the climate division drought database (TD-9640), the hurricane datasets (TD-9636 and TD-9697), the tornado dataset (STORM DATA), and the monthly station dataset (LCD supplemental files). It should be noted that the climate division drought database consists of monthly data for 344 climate divisions in the contiguous United States. These divisional values are calculated from the 6000+ station Cooperative Observer network.

If you have access to the Internet, copies of the CVB are available via both the NCDC's World Wide Web (WWW) server and the NCDC's anonymous FTP server.

NCDC's WWW server

URL for the CVB: <http://www.ncdc.noaa.gov/ol/documentlibrary/cvb.html>

NCDC's anonymous FTP server

Machine: <ftp.ncdc.noaa.gov>

Directory: [/pub/data/cvb](ftp://ftp.ncdc.noaa.gov/pub/data/cvb)

If you are a climate researcher and would like to order copies of the historical datasets used to make graphs of the type in this report, call 704-271-4994 or fax a letter to 704-271-4876 or mail a letter to the address given below, ATTN: Research User Services.

All other questions or requests for data should be made by calling 704-271-4800 or sending a fax to 704-271-4876 or by writing to:

National Climatic Data Center, NOAA
Federal Building
151 Patton Avenue, Room 120
Asheville, NC 28801-5001

If you use any of the information from this CVB, please identify "National Climatic Data Center, NOAA" as the source.

UNITED STATES DECEMBER AND ANNUAL CLIMATE IN HISTORICAL PERSPECTIVE

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Notice: This issue of the Climate Variations Bulletin will be the last paper copy issue mailed. The CVB will continue to be available at our website.

TABLE 1. PRECIPITATION AND TEMPERATURE RANKS, BASED
ON THE PERIOD 1895-1997.
1 = DRIEST/COLDEST, 103 = WETTEST/WARMEST

REGION	DEC 1997	NOV-DEC 1997	JUL-DEC 1997	JAN-DEC 1997
-----	----	-----	-----	-----
PRECIPITATION:				
NORTHEAST	9	54	11	12
EAST NORTH CENTRAL	9	5	13	21
CENTRAL	21	20	6	28
SOUTHEAST	76	85	58	69
WEST NORTH CENTRAL	35	29	65	56
SOUTH	82	59	40	87
SOUTHWEST	59	58	52	73
NORTHWEST	10	8	50	73
WEST	43	66	77	47
NATIONAL	34	40	26	61
TEMPERATURE:				
NORTHEAST	66	48	28	33
EAST NORTH CENTRAL	96	81	69	47
CENTRAL	50	34	23	20
SOUTHEAST	36	23	18	34
WEST NORTH CENTRAL	97	81	92	71
SOUTH	25	11	21	20
SOUTHWEST	32	41	54	77
NORTHWEST	51	70	87	89
WEST	41	66	84	98
NATIONAL	61	47	56	60

TABLE 2. EXTREMES, 1961-90 NORMALS, AND 1997 VALUES FOR DECEMBER. IT SHOULD BE NOTED THAT THE 1997 VALUES WILL CHANGE WHEN THE FINAL DATA ARE PROCESSED.

REGION	PRECIPITATION (INCHES)					
	DRIEST		WETTEST		NORMAL	1997
	VALUE	YEAR	VALUE	YEAR	PCPN	PCPN
-----	-----	-----	-----	-----	-----	-----
NORTHEAST	.98	1955	6.74	1973	3.45	1.89
EAST NORTH CENTRAL	.37	1943	2.62	1982	1.44	.64
CENTRAL	.90	1958	7.58	1990	3.44	2.03
SOUTHEAST	1.18	1955	7.05	1953	3.87	4.51
WEST NORTH CENTRAL	.19	1986	1.20	1917	.65	.53
SOUTH	.64	1917	5.51	1911	2.49	3.17
SOUTHWEST	.11	1929	2.29	1965	.96	.91
NORTHWEST	1.17	1976	8.42	1996	4.03	2.06
WEST	.09	1989	7.05	1955	2.33	1.77
NATIONAL	1.22	1958	3.60	1982	2.30	1.95*

* PRELIMINARY VALUE, CONFIDENCE
INTERVAL + OR - .09 INCHES

REGION	TEMPERATURE (DEGREES F)					
	COLDEST		WARMEST		NORMAL	1997
	VALUE	YEAR	VALUE	YEAR	TEMP	TEMP
-----	-----	-----	-----	-----	-----	-----
NORTHEAST	13.3	1989	34.5	1923	26.6	28.7
EAST NORTH CENTRAL	6.9	1983	29.0	1923	18.6	26.7
CENTRAL	21.9	1989	42.0	1923	33.0	33.9
SOUTHEAST	39.3	1989	55.9	1931	47.3	46.1
WEST NORTH CENTRAL	4.3	1983	30.0	1939	19.4	25.8
SOUTH	33.6	1983	51.0	1933	43.5	42.0
SOUTHWEST	24.8	1909	39.9	1980	32.6	31.2
NORTHWEST	21.9	1990	37.9	1917	29.4	30.2
WEST	33.0	1990	45.6	1929	38.7	38.3
NATIONAL	25.8	1983	38.4	1939	32.8	34.1*

* PRELIMINARY VALUE, CONFIDENCE
INTERVAL + OR - .1 DEG. F.

TABLE 3. EXTREMES, 1961-90 NORMALS, AND 1997 VALUES
FOR JANUARY THROUGH DECEMBER, 1997

REGION	PRECIPITATION (INCHES)					
	DRIEST		WETTEST		NORMAL	1997
	VALUE	YEAR	VALUE	YEAR	PCPN	PCPN
-----	-----	-----	-----	-----	-----	-----
NORTHEAST	31.77	1930	53.79	1996	41.63	36.31
EAST NORTH CENTRAL	19.81	1910	36.63	1951	30.50	26.52
CENTRAL	30.56	1930	53.38	1990	43.05	40.05
SOUTHEAST	37.56	1954	62.39	1929	51.03	52.31
WEST NORTH CENTRAL	11.49	1934	22.86	1915	16.92	16.92
SOUTH	23.40	1917	46.91	1973	35.72	39.87
SOUTHWEST	7.68	1956	22.10	1941	13.64	14.48
NORTHWEST	19.00	1929	37.30	1996	27.50	29.12
WEST	9.97	1947	31.47	1983	16.51	16.20
NATIONAL	24.17	1910	33.99	1973	29.46	29.62*

* PRELIMINARY VALUE, CONFIDENCE
INTERVAL + OR - .19 INCHES

REGION	TEMPERATURE (DEGREES F)					
	COLDEST		WARMEST		NORMAL	1997
	VALUE	YEAR	VALUE	YEAR	TEMP	TEMP
-----	-----	-----	-----	-----	-----	-----
NORTHEAST	43.1	1904	48.9	1953	46.1	45.8
EAST NORTH CENTRAL	39.5	1917	48.0	1931	43.5	43.4
CENTRAL	50.6	1917	56.9	1921	53.2	52.6
SOUTHEAST	61.0	1901	65.0	1921	62.4	62.4
WEST NORTH CENTRAL	39.9	1916	46.7	1934	43.3	43.8
SOUTH	60.4	1979	64.9	1921	62.0	61.5
SOUTHWEST	49.5	1912	54.6	1934	51.8	52.3
NORTHWEST	44.1	1955	50.2	1934	46.7	47.8
WEST	53.0	1911	57.8	1934	55.0	56.8
NATIONAL	50.7	1917	54.7	1934	52.4	52.6*

* PRELIMINARY VALUE, CONFIDENCE
INTERVAL + OR - .0 DEG. F.

TABLE 4.

STATISTICS FOR SELECTED RIVER BASINS: PRECIPITATION RANKING FOR OCT-DEC 1997, WHERE RANK OF 1 = DRIEST, 103 = WETTEST, BASED ON THE PERIOD 1895 TO 1997, AREAL PERCENT OF THE BASIN EXPERIENCING SEVERE OR EXTREME LONG-TERM (PALMER) DROUGHT, AND AREAL PERCENT OF THE BASIN EXPERIENCING SEVERE OR EXTREME LONG-TERM (PALMER) WET CONDITIONS, AS OF DECEMBER 1997. RIVER BASIN REGIONS AS DEFINED BY THE U.S. WATER RESOURCES COUNCIL.

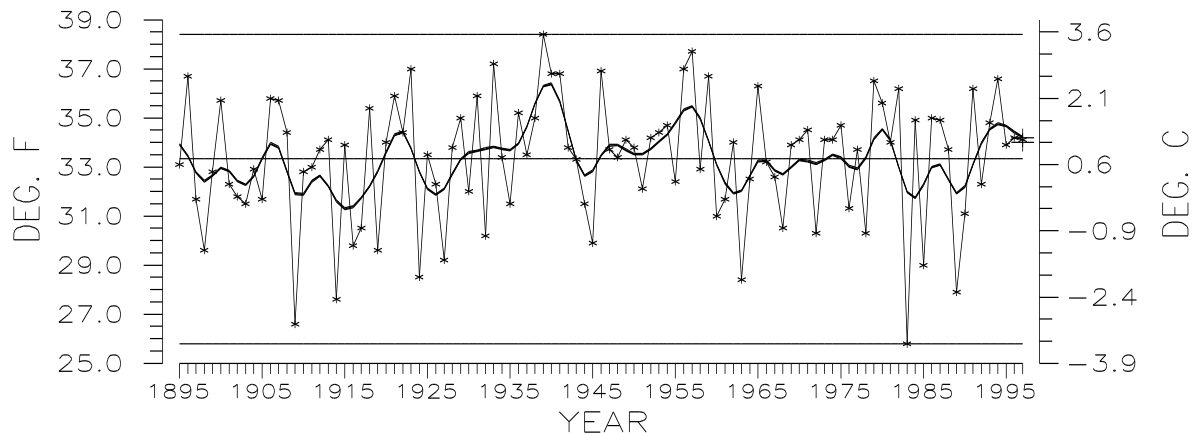
RIVER BASIN -----	PRECIPITATION RANK -----	% AREA DRY -----	% AREA WET -----
MISSOURI BASIN	74	.0%	24.4%
PACIFIC NORTHWEST BASIN	27	.0%	23.7%
CALIFORNIA RIVER BASIN	72	.0%	.0%
GREAT BASIN	21	.0%	.0%
UPPER COLORADO BASIN	11	.0%	6.6%
LOWER COLORADO BASIN	57	14.1%	.0%
RIO GRANDE BASIN	65	.0%	.0%
ARKANSAS-WHITE-RED BASIN	67	.0%	38.5%
TEXAS GULF COAST BASIN	69	.0%	29.7%
SOURIS-RED-RAINY BASIN	34	11.5%	.0%
UPPER MISSISSIPPI BASIN	28	.0%	.0%
LOWER MISSISSIPPI BASIN	35	.0%	.0%
GREAT LAKES BASIN	5	34.6%	.0%
OHIO RIVER BASIN	13	16.5%	.0%
TENNESSEE RIVER BASIN	22	.0%	.0%
NEW ENGLAND BASIN	9	29.4%	7.7%
MID-ATLANTIC BASIN	39	8.7%	.0%
SOUTH ATLANTIC-GULF BASIN	93	.0%	20.1%

TABLE 5.

STATISTICS FOR SELECTED RIVER BASINS: PRECIPITATION RANKING FOR JAN-DEC 1997, WHERE RANK OF 1 = DRIEST, 103 = WETTEST, BASED ON THE PERIOD 1895 TO 1997, AREAL PERCENT OF THE BASIN EXPERIENCING SEVERE OR EXTREME LONG-TERM (PALMER) DROUGHT, AND AREAL PERCENT OF THE BASIN EXPERIENCING SEVERE OR EXTREME LONG-TERM (PALMER) WET CONDITIONS, AS OF DEC 1997. RIVER BASIN REGIONS AS DEFINED BY THE U.S. WATER RESOURCES COUNCIL.

RIVER BASIN -----	PRECIPITATION RANK -----	% AREA DRY -----	% AREA WET -----
MISSOURI BASIN	69	.0%	24.4%
PACIFIC NORTHWEST BASIN	74	.0%	23.7%
CALIFORNIA RIVER BASIN	48	.0%	.0%
GREAT BASIN	66	.0%	.0%
UPPER COLORADO BASIN	56	.0%	6.6%
LOWER COLORADO BASIN	60	14.1%	.0%
RIO GRANDE BASIN	85	.0%	.0%
ARKANSAS-WHITE-RED BASIN	82	.0%	38.5%
TEXAS GULF COAST BASIN	93	.0%	29.7%
SOURIS-RED-RAINY BASIN	24	11.5%	.0%
UPPER MISSISSIPPI BASIN	28	.0%	.0%
LOWER MISSISSIPPI BASIN	78	.0%	.0%
GREAT LAKES BASIN	34	34.6%	.0%
OHIO RIVER BASIN	31	16.5%	.0%
TENNESSEE RIVER BASIN	61	.0%	.0%
NEW ENGLAND BASIN	14	29.4%	7.7%
MID-ATLANTIC BASIN	13	8.7%	.0%
SOUTH ATLANTIC-GULF BASIN	76	.0%	20.1%

U.S. NATIONAL TEMPERATURE DECEMBER, 1895-1997



National Climatic Data Center, NOAA

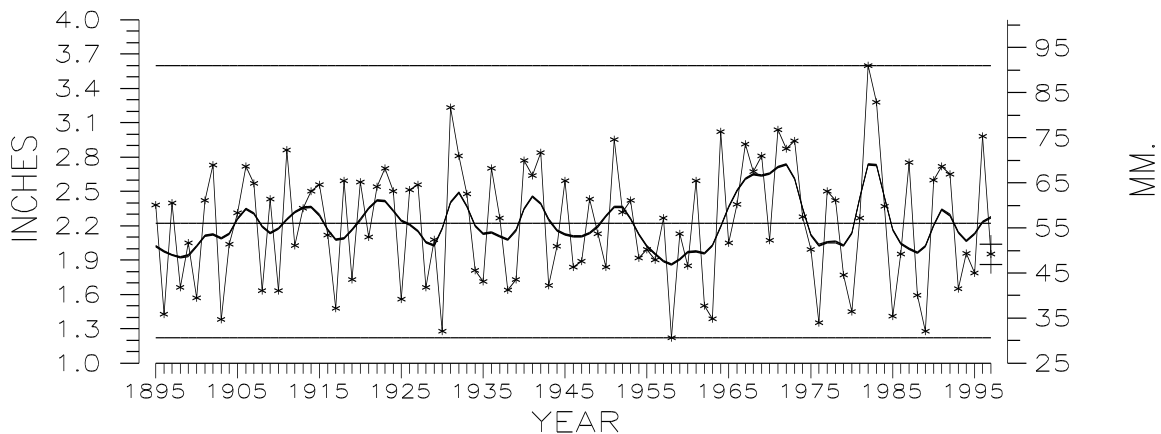
STRAIGHT HORIZONTAL LINES ARE:
MAXIMUM VALUE (TOP),
LONG-TERM AVERAGE (MIDDLE),
MINIMUM VALUE (BOTTOM)

THICK SMOOTH CURVE
IS 9-POINT BINOMIAL
FILTER.

CONFIDENCE INTERVAL
FOR CURRENT YEAR IS
INDICATED BY '+'.
+

Figure 1: Preliminary data indicate that December 1997 was the 43rd warmest such month since 1895. Over ten percent of the country was much warmer than normal while only about three percent of the country was much cooler than normal. The last five such months have been above- to much-above the long-term mean.

U.S. NATIONAL PRECIPITATION DECEMBER, 1895-1997



National Climatic Data Center, NOAA

STRAIGHT HORIZONTAL LINES ARE:
MAXIMUM VALUE (TOP),
LONG-TERM AVERAGE (MIDDLE),
MINIMUM VALUE (BOTTOM)

THICK SMOOTH CURVE
IS 9-POINT BINOMIAL
FILTER.

CONFIDENCE INTERVAL
FOR CURRENT YEAR IS
INDICATED BY '+'.
+

Figure 2: Preliminary data for December 1997 indicate that precipitation averaged across the contiguous United States was below the long-term mean, ranking as the 34th driest December since 1895. Over one-sixth (17.5%) of the country averaged much drier than normal, while 10.4% was much wetter than normal.

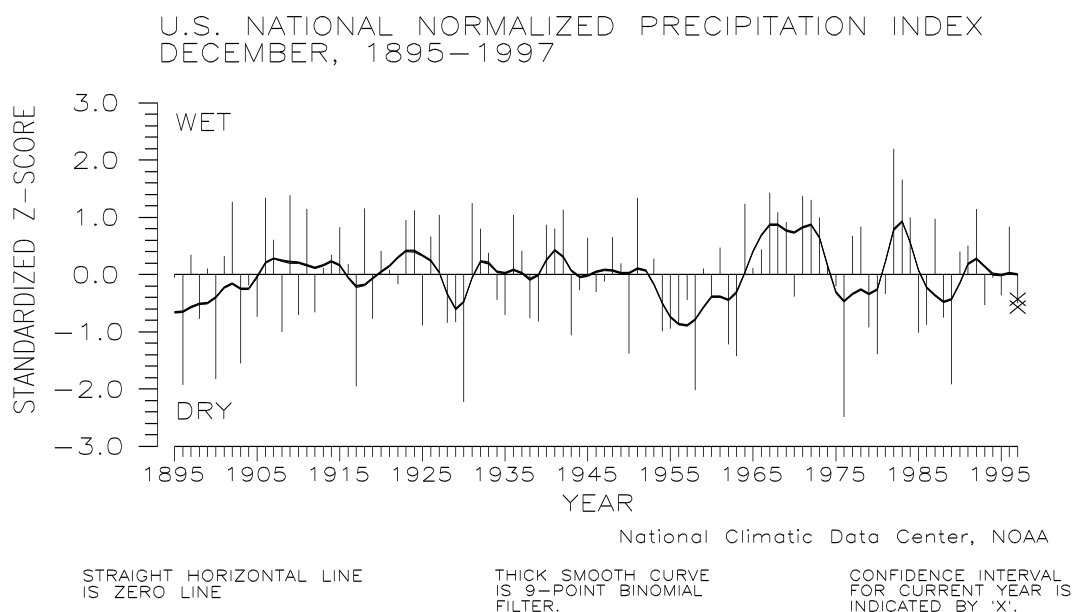


Figure 3: The preliminary national standardized precipitation index ranked December 1997 as the 34th driest December on record. This standardized z-score is estimated to be accurate to within 0.07 index units.

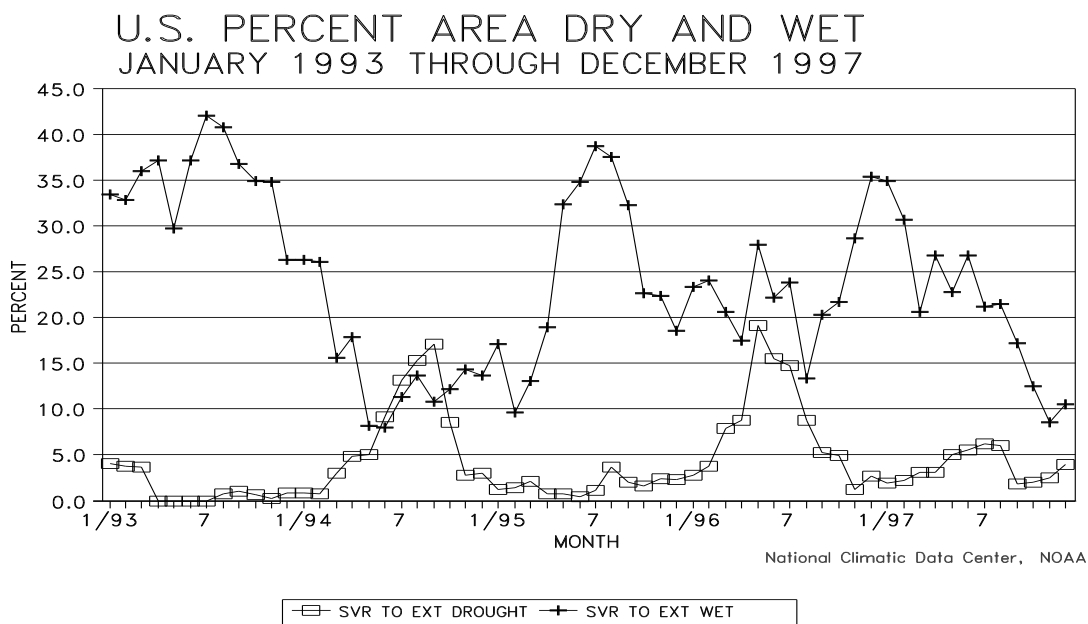


Figure 4: Long-term drought coverage (as measured by the Palmer Drought Index) remained nearly steady during December 1997 with four percent of the country experiencing severe to extreme drought. About ten percent of the country was experiencing severe to extreme wetness by the end of December. Core wet areas included the Northern Rockies, Central and Southern Plains, and portions of the Southeast. Core dry areas included portions of the Southwest, Ohio valley, Northern Great Lakes, and portions of New England.

PRIMARY HARD RED WINTER WHEAT BELT PRECIPITATION OCTOBER–DECEMBER, 1895–1997

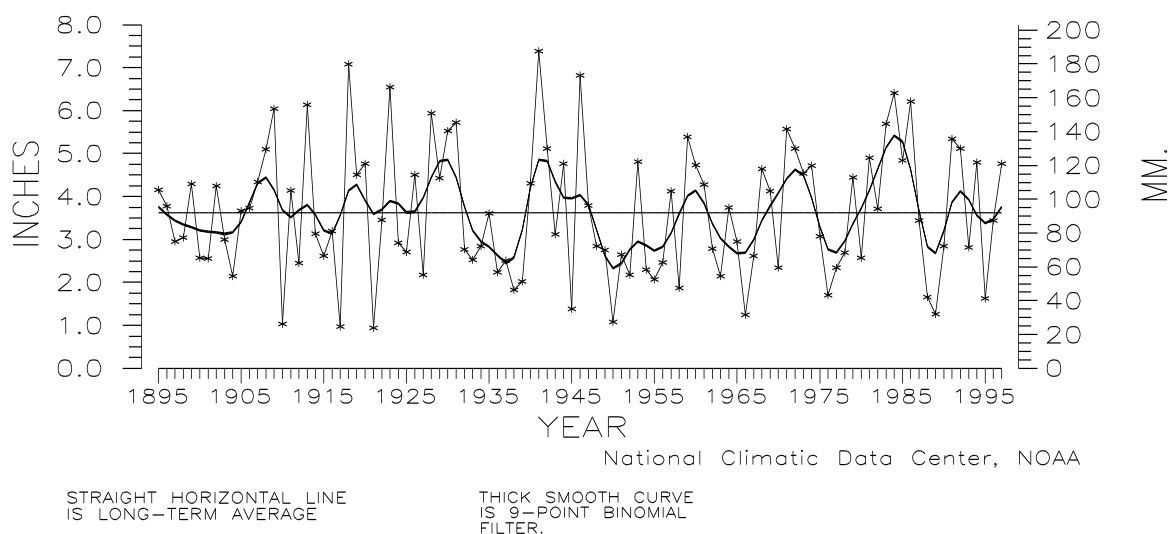


Figure 5: Total precipitation during the first three months of the growing season for the Primary Hard Red Winter Wheat Belt averaged above normal.

EAST-NORTH CENTRAL REGION PRECIPITATION DECEMBER, 1895–1997

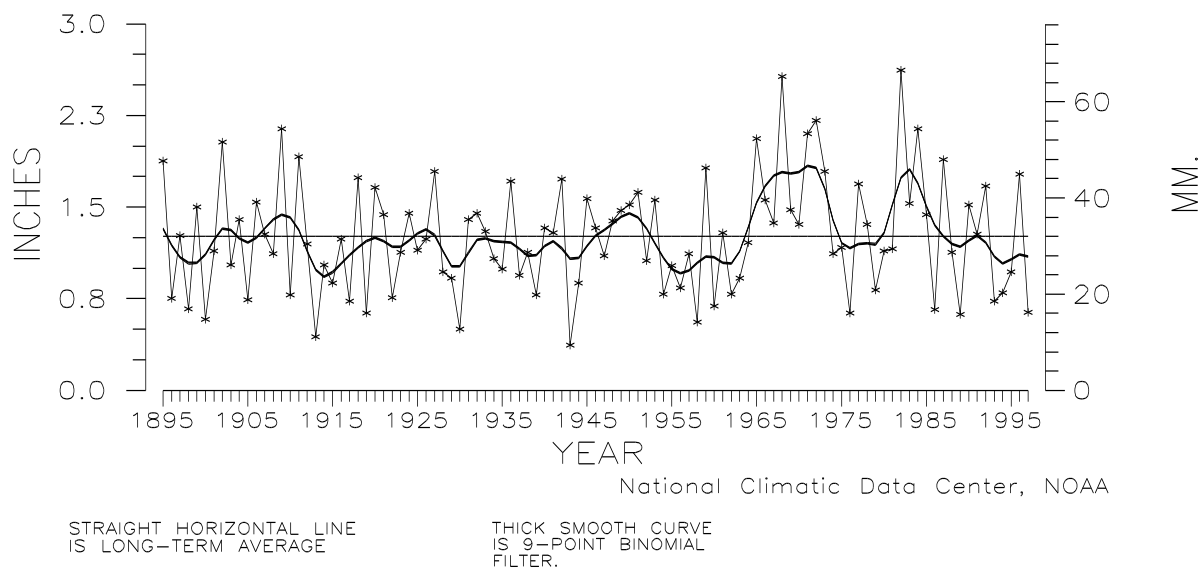


Figure 6: Based upon preliminary data, December 1997 was the ninth driest such month since 1895 for the East-North Central Region. Precipitation for four of the last five such months have been below- to much below normal. This region includes the states of Iowa, Michigan, Minnesota, and Wisconsin.

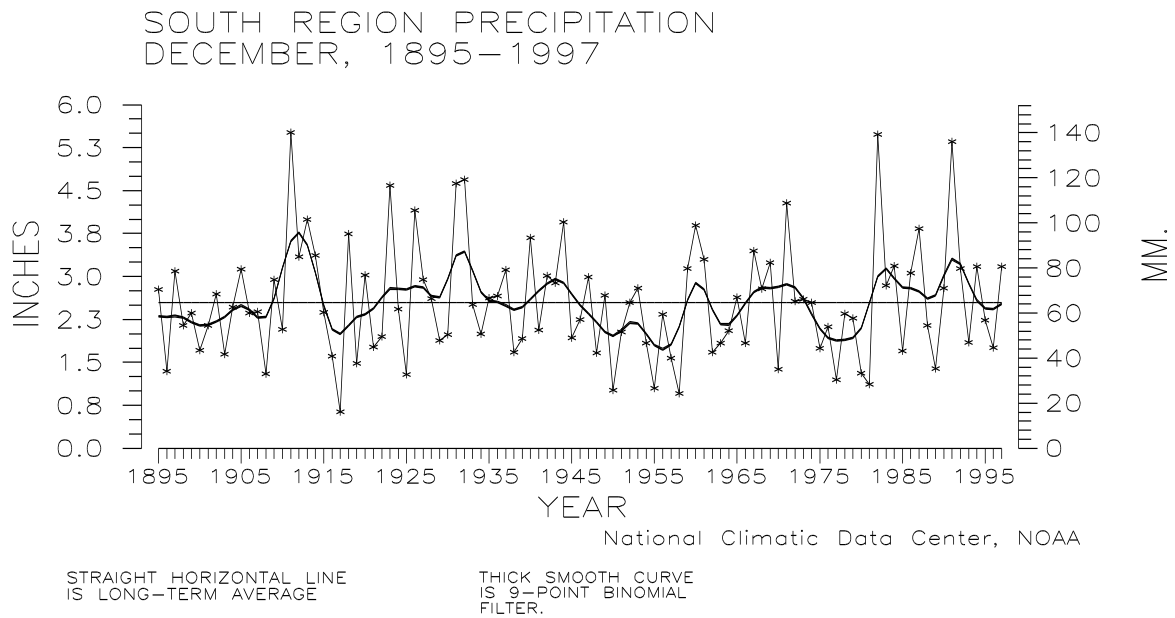


Figure 7: Based upon preliminary data, December 1997 was the 22nd wettest such month since records began for the South region. This region includes the states of Arkansas, Kansas, Louisiana, Mississippi, Oklahoma, and Texas.

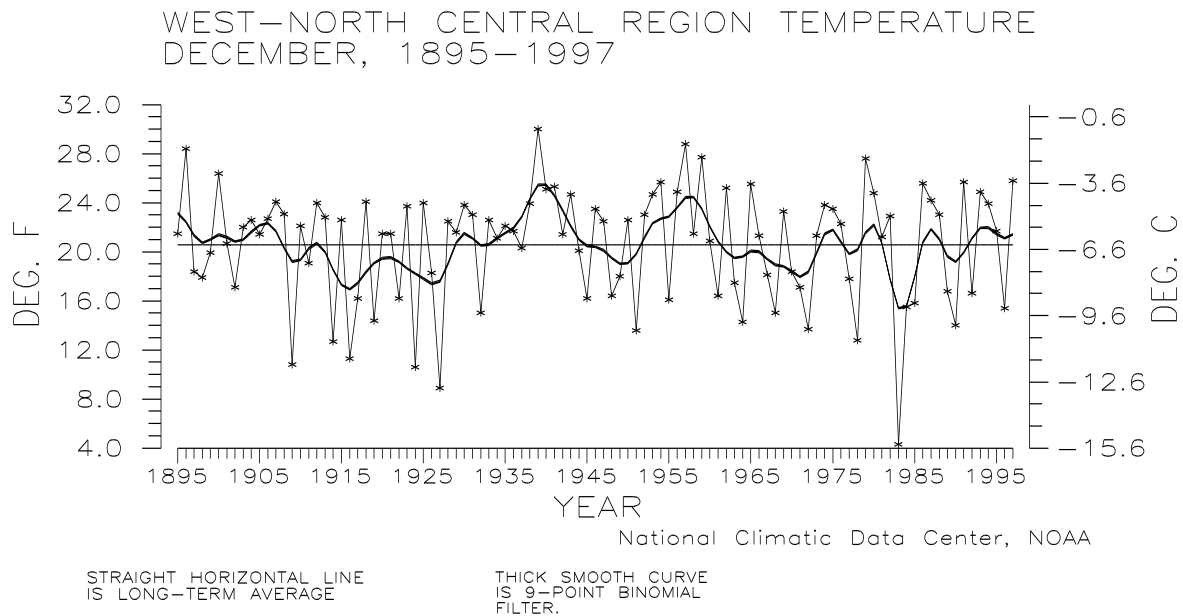


Figure 8: Based on preliminary data, December 1997 was the seventh warmest such month since records began for the West-North Central Region. Four of the last six such months have been much warmer than normal. This region includes Montana, Nebraska, North Dakota, South Dakota, and Wyoming.

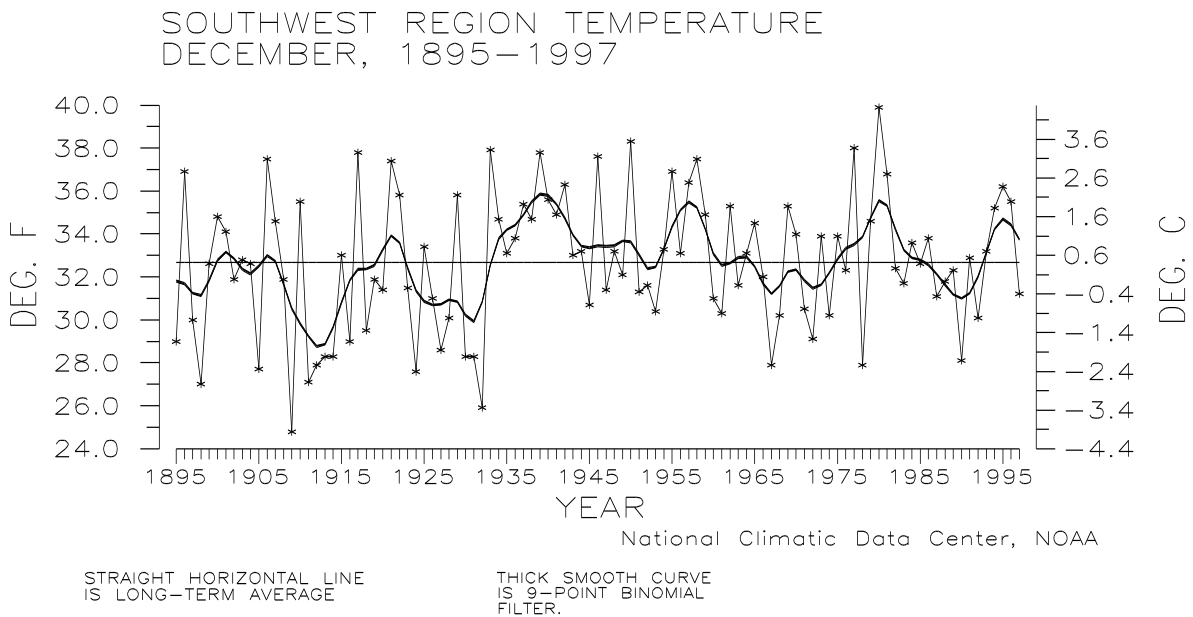


Figure 9: Preliminary data indicate that December 1997 was the 32nd coolest such month on record for the Southwest region. The last three consecutive Decembers had been much warmer than normal. The Southwest region includes Arizona, Colorado, New Mexico, and Utah.

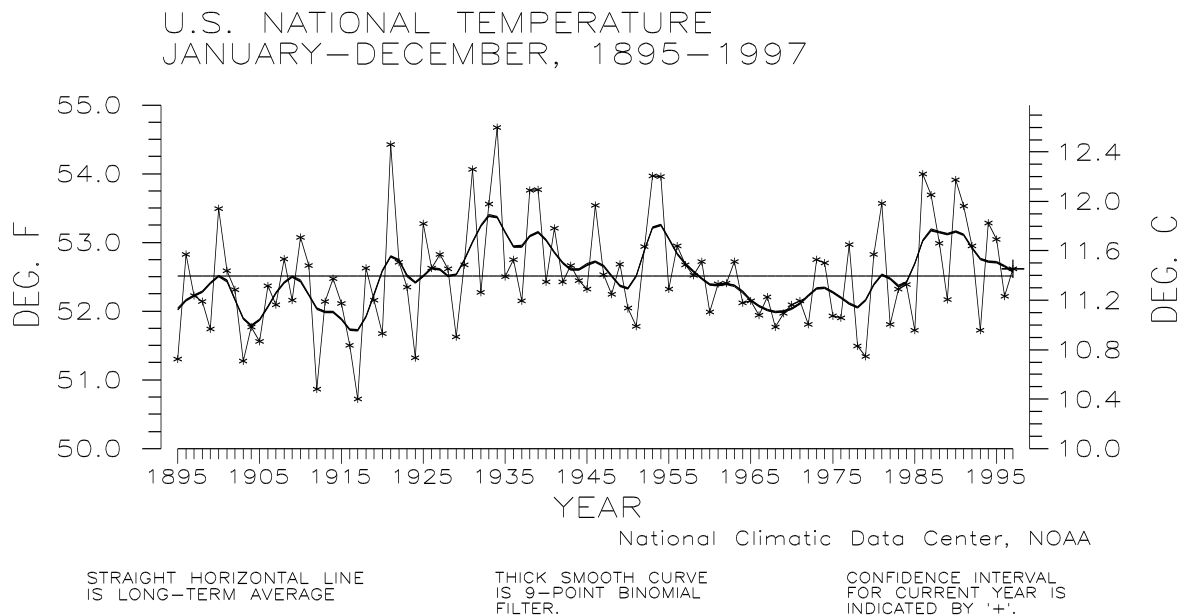


Figure 10: Preliminary data indicate that Annual 1997 temperature averaged across the contiguous United States was near the long-term mean, ranking as the 44th warmest year on record. Over ten percent of the country was much warmer than normal while nearly fourteen percent of the country was much cooler than normal for the year.

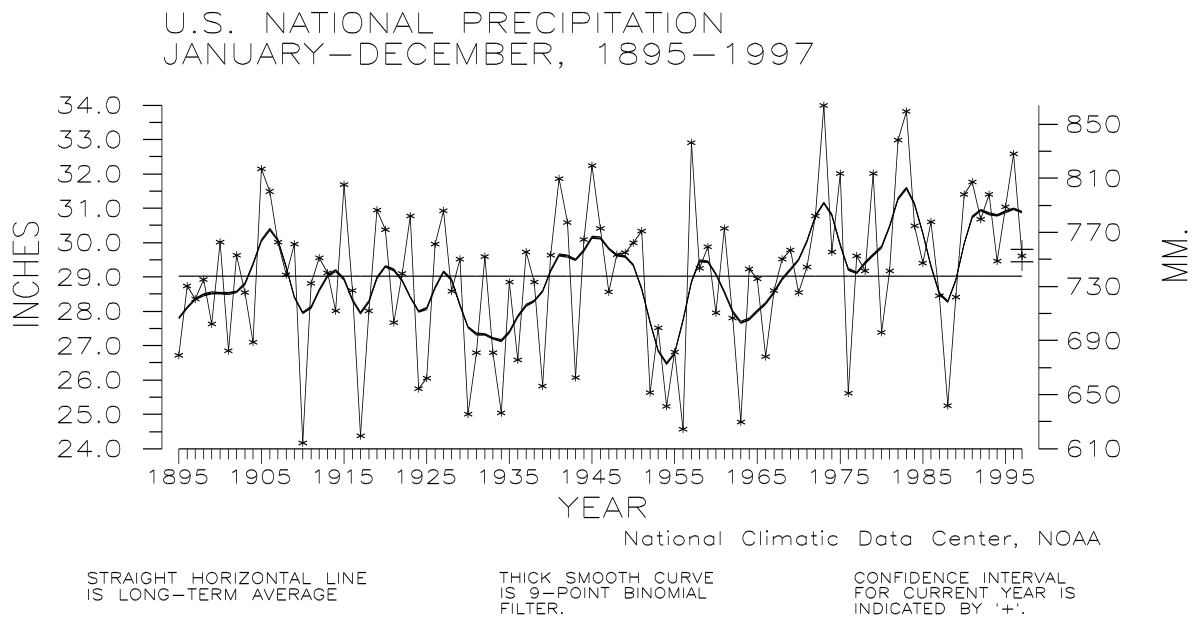


Figure 11: Preliminary data indicate that Annual 1997 precipitation averaged across the contiguous United States was above the long-term mean, ranking as the 43rd wettest year on record. National precipitation for 1997 fit the pattern that has dominated since the early 1970's, that is, with few exceptions, near- to much wetter than the long-term mean.

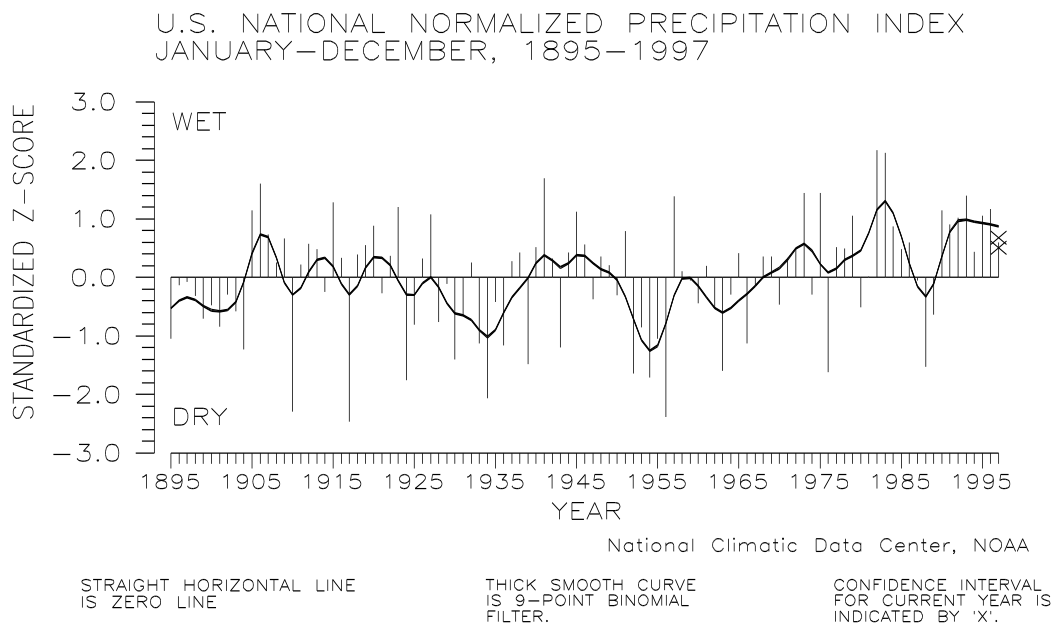


Figure 12: The preliminary national annual standardized precipitation index ranked 1997 as the 26th wettest year on record. This standardized z-score is estimated to be accurate to within 0.083 index units. About twelve percent of the country averaged much wetter than normal for the year, with only five percent averaging much drier than normal.

NORTHEAST REGION PRECIPITATION JANUARY–DECEMBER, 1895–1997

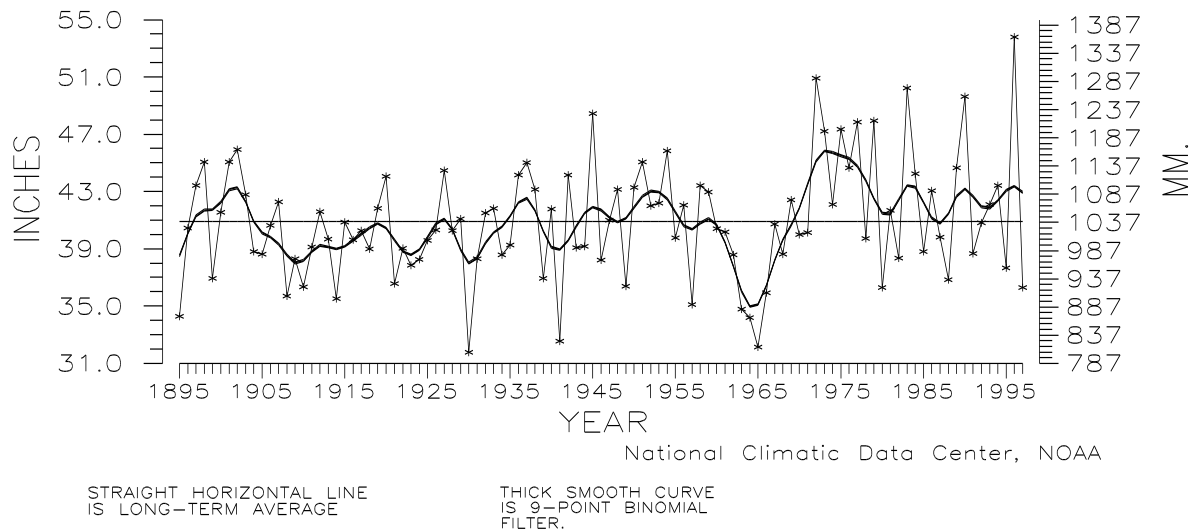


Figure 13: After recording the wettest year on record for the Northeast Region in 1996, 1997 was much drier. Preliminary data suggest that 1997 was the 12th driest year since 1895.

SOUTH REGION PRECIPITATION JANUARY–DECEMBER, 1895–1997

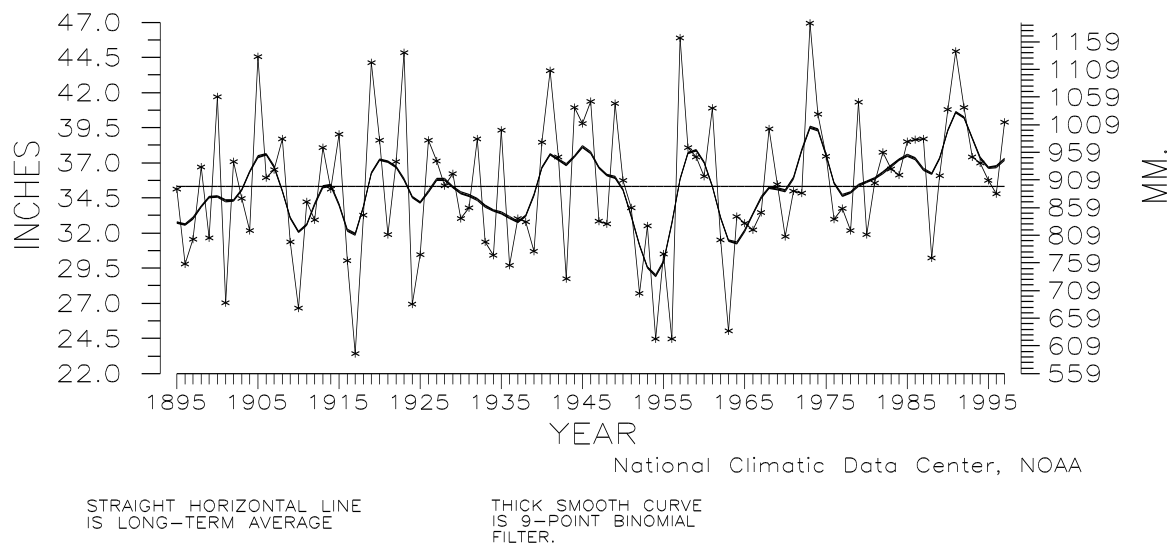


Figure 14: The South Region had the 17th wettest year on record during 1997. Four of the last eight years have been much wetter than normal.

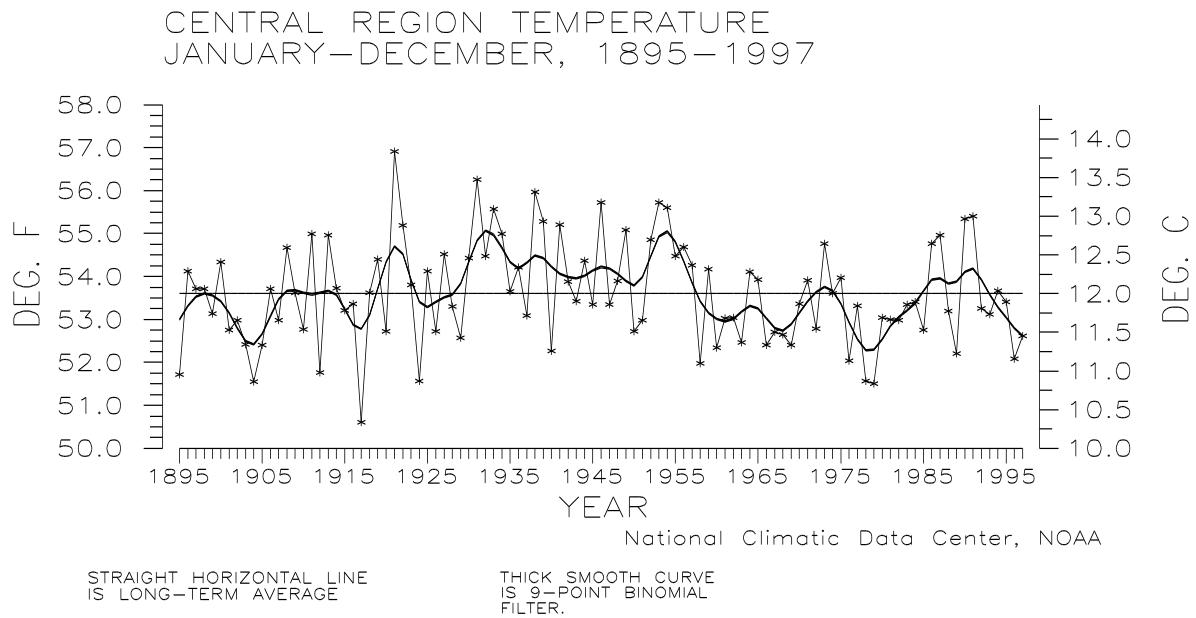


Figure 15: Preliminary data suggest that 1997 was the 20th coldest year on record for the Central Region. The last five consecutive years have been at or below normal.

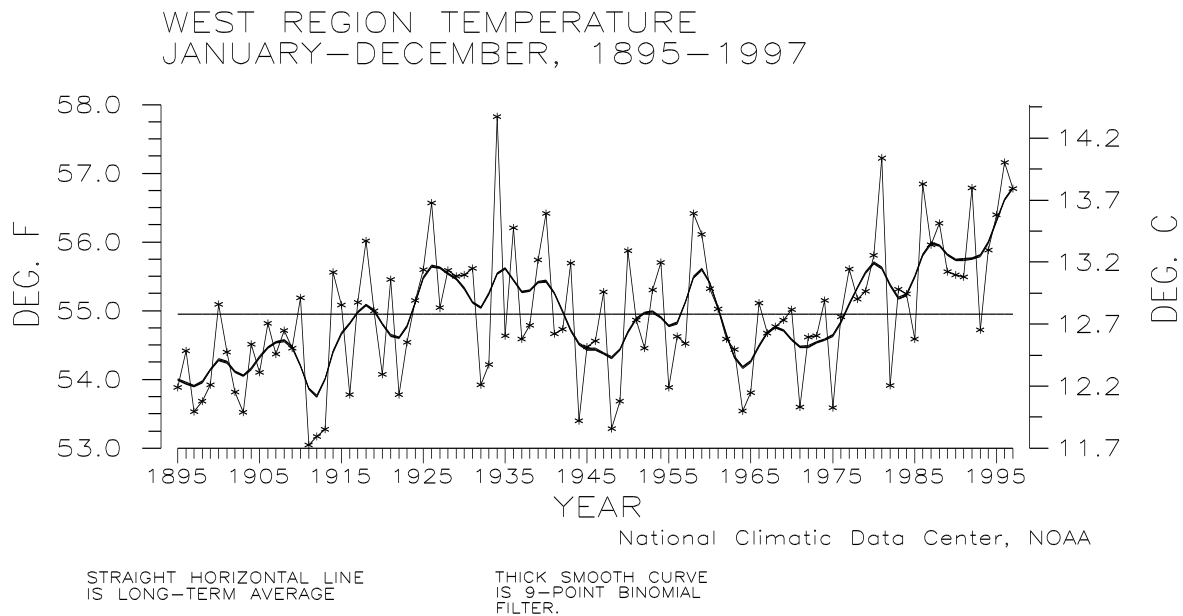


Figure 16: The string of warm years continues for the West Region with 1997 being the sixth warmest year on record. Eighteen of the last twenty-one years have been above- to much above the long-term mean. The West Region includes California and Nevada.

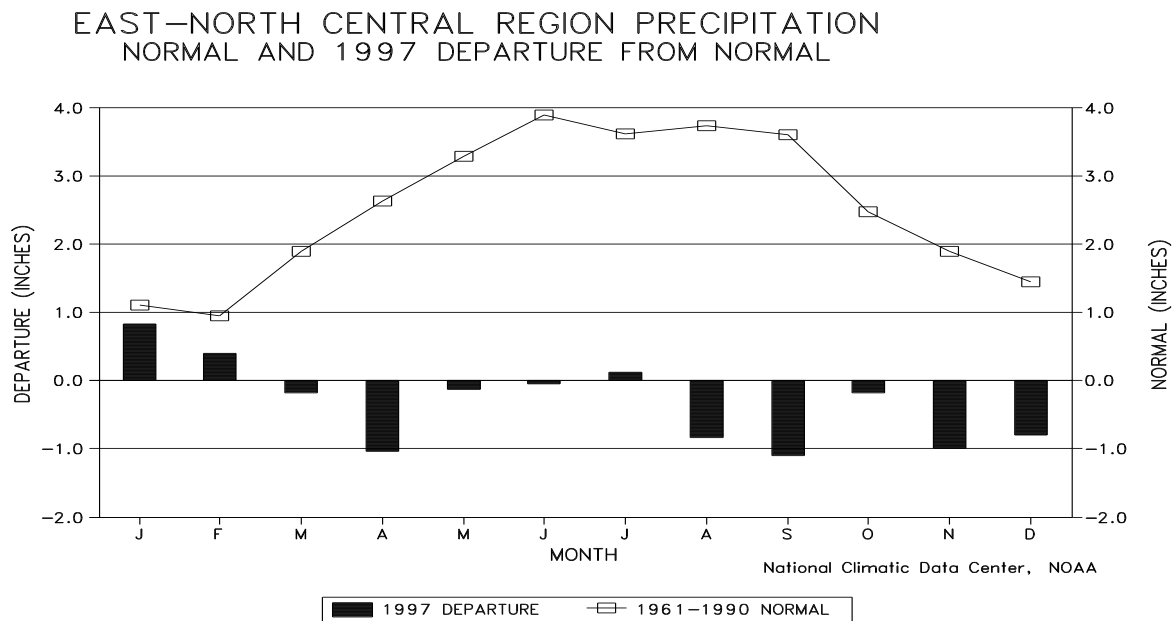


Figure 17: Every month during 1997, except three, provided below normal precipitation for the East-North Central Region.

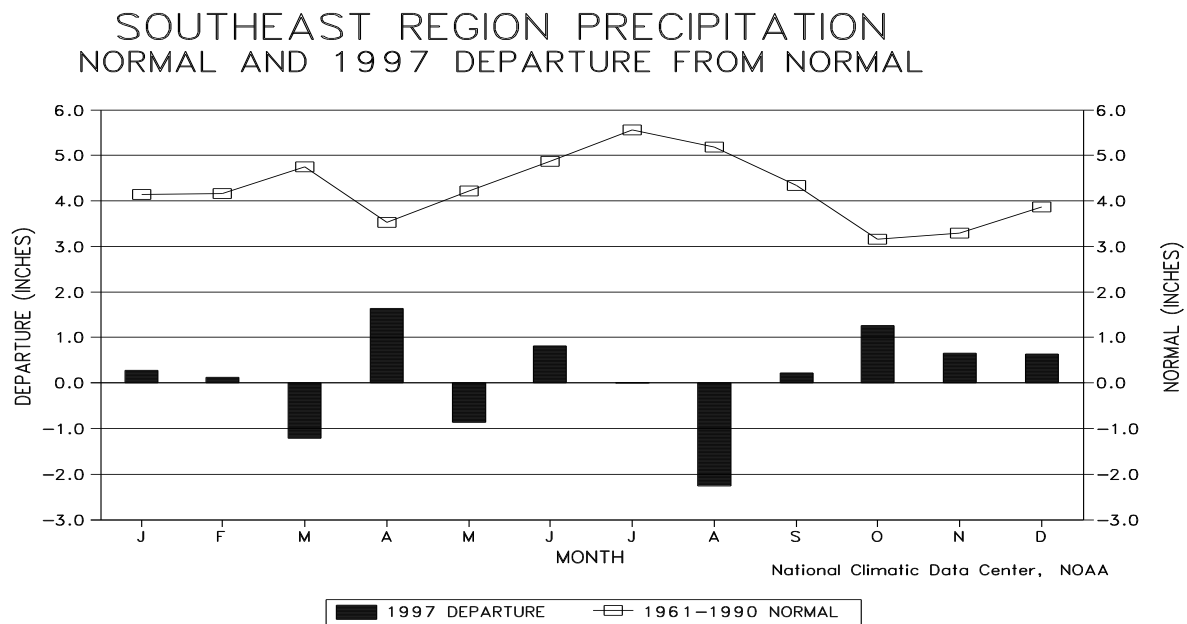


Figure 18: It was the 35 wettest year on record for the Southeast Region, based upon preliminary data. Eight of the twelve months had above normal precipitation including the last four. During an El Nino episode, the Gulf Coastal region and the extreme Southeast are usually wetter than normal. This may be reflected in the September through December positive anomalies.

SOUTH REGION TEMPERATURE NORMAL AND 1997 DEPARTURE FROM NORMAL

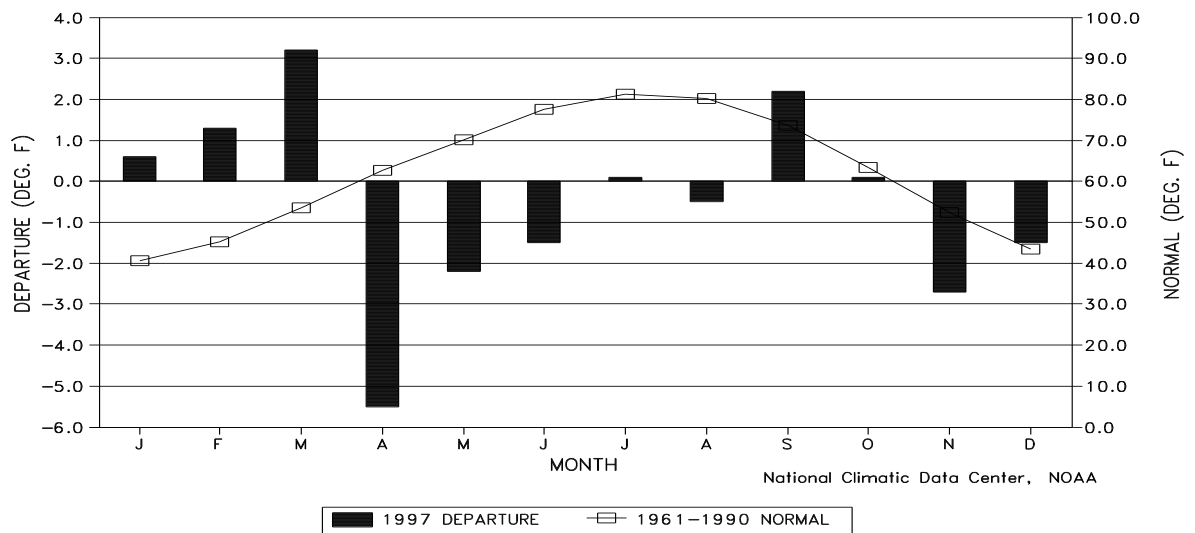


Figure 19: It was the 20th coolest year on record for the South Region. Six months had temperatures in excess of one degree below normal including April, which was greater than five degrees below normal. May and November were each greater than two degrees below normal.

WEST-NORTH CENTRAL REGION TEMPERATURE NORMAL AND 1997 DEPARTURE FROM NORMAL

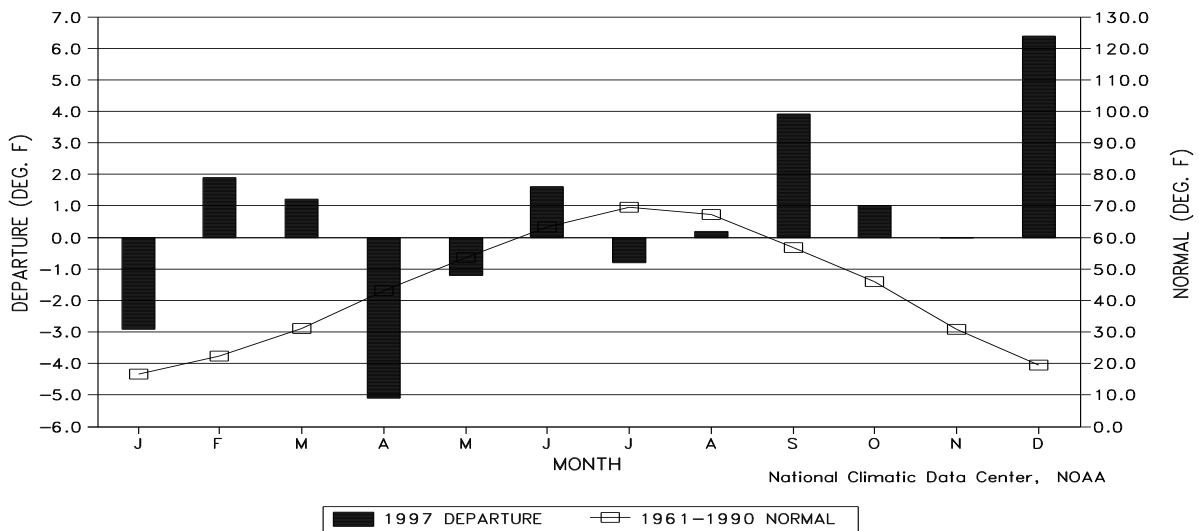
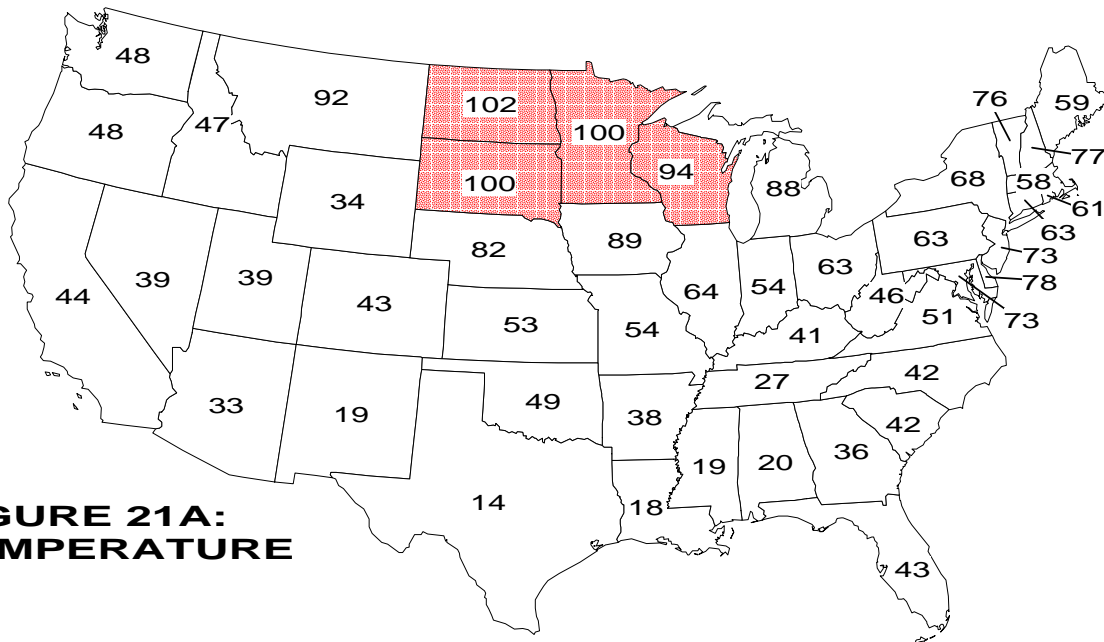
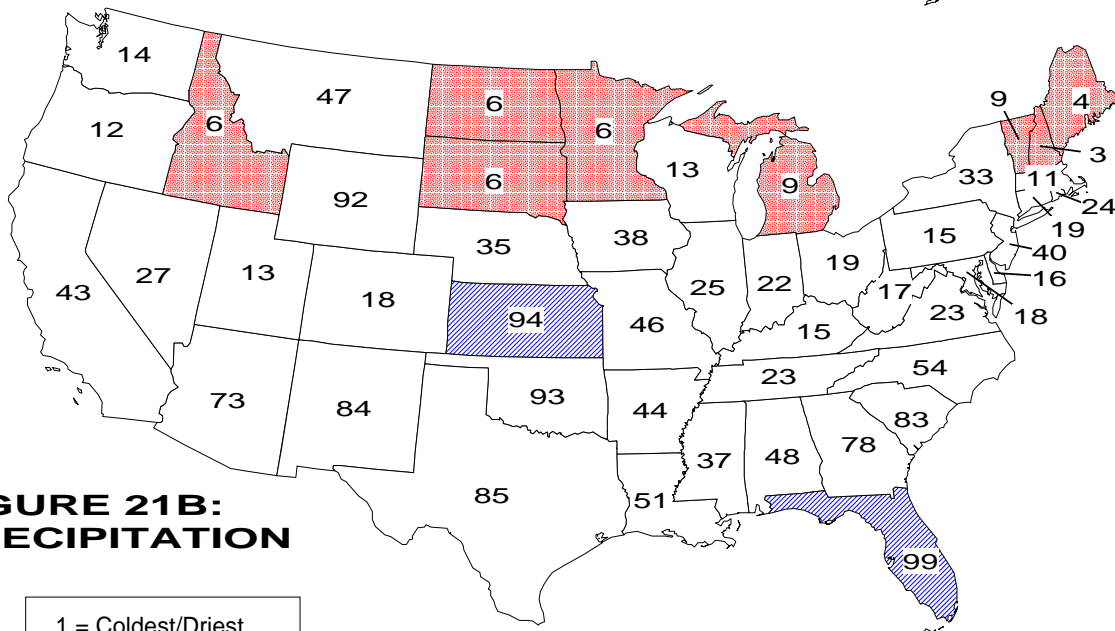


Figure 20: It was the 33rd warmest year on record for the West-North Central Region. Seven of the twelve months had above normal temperature departures including September, October, and December. December had a positive departure of over six degrees and ranked as the seventh warmest such month on record. Research indicates that this area of the country is usually warmer than normal during an El Niño episode. This may be reflected in the September through December positive anomalies.

DECEMBER 1997 STATEWIDE RANKS



**FIGURE 21A:
TEMPERATURE**



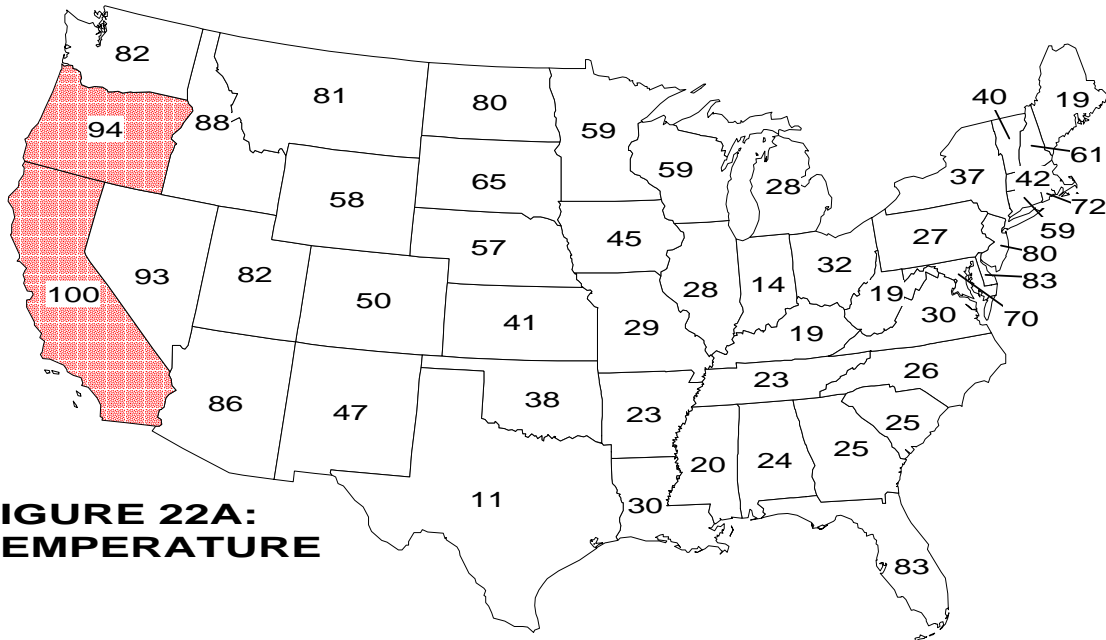
**FIGURE 21B:
PRECIPITATION**

1 = Coldest/Driest
103 = Warmest/Wettest

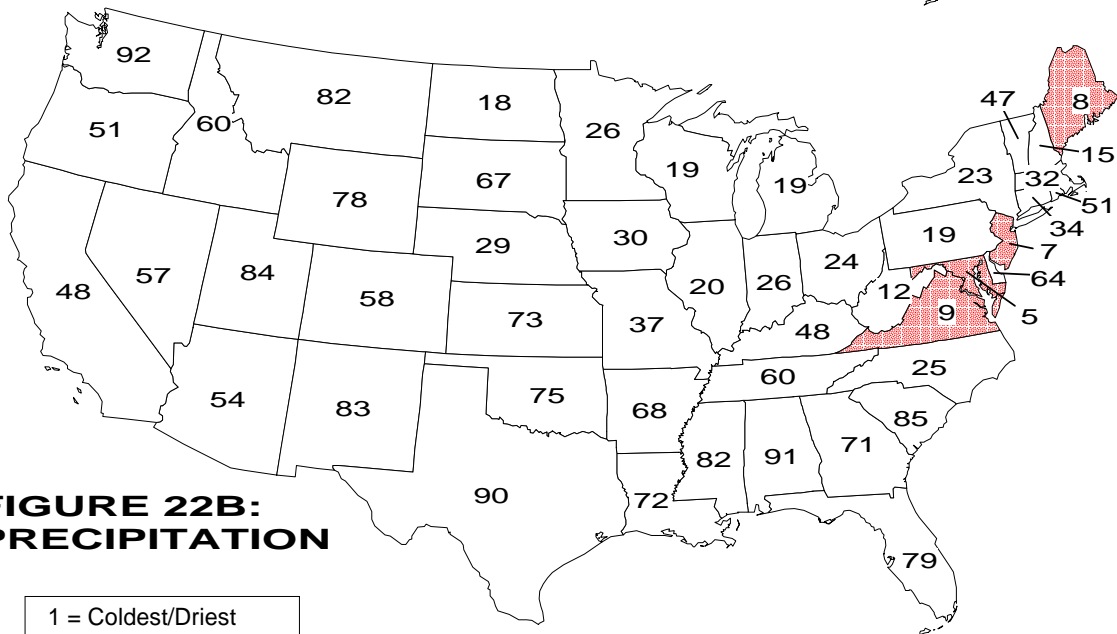
National Climatic Data Center, NOAA

Temperature and Precipitation Ranks for the contiguous United States. Each state is ranked based on its data from 1895-1997. States having a rank of top ten coldest or driest (rank 1-10) or top ten warmest or wettest (rank 94-103) are shaded.

JAN-DEC 1997 STATEWIDE RANKS



**FIGURE 22A:
TEMPERATURE**



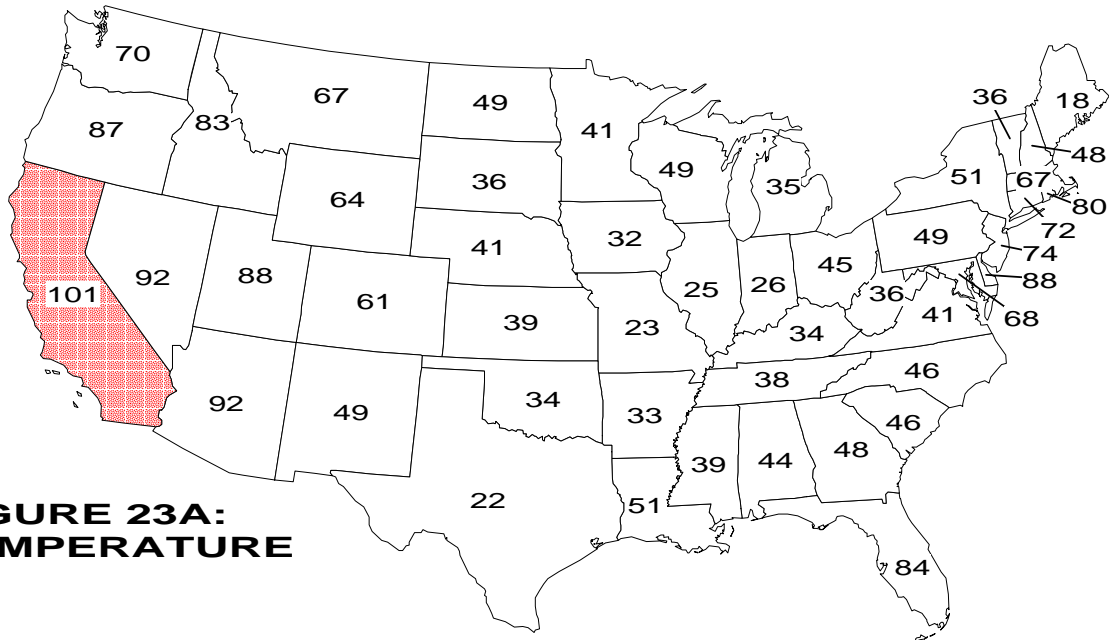
**FIGURE 22B:
PRECIPITATION**

1 = Coldest/Driest
103 = Warmest/Wettest

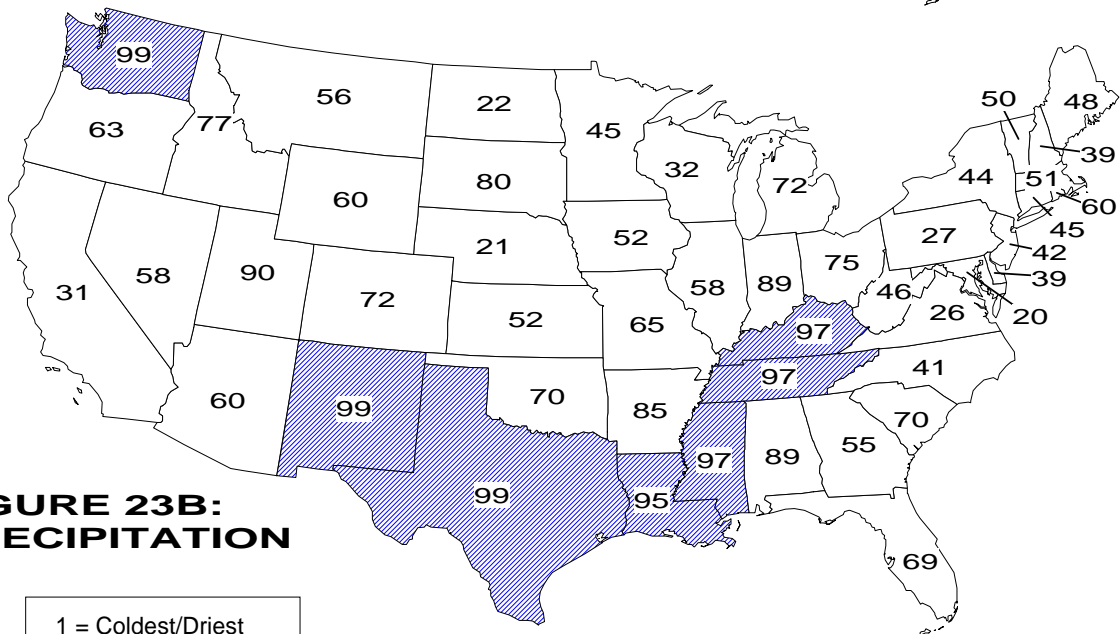
National Climatic Data Center, NOAA

Temperature and Precipitation Ranks for the contiguous United States. Each state is ranked based on its data from 1895-1997. States having a rank of top ten coldest or driest (rank 1-10) or top ten warmest or wettest (rank 94-103) are shaded.

JAN-JUN 1997 STATEWIDE RANKS



**FIGURE 23A:
TEMPERATURE**



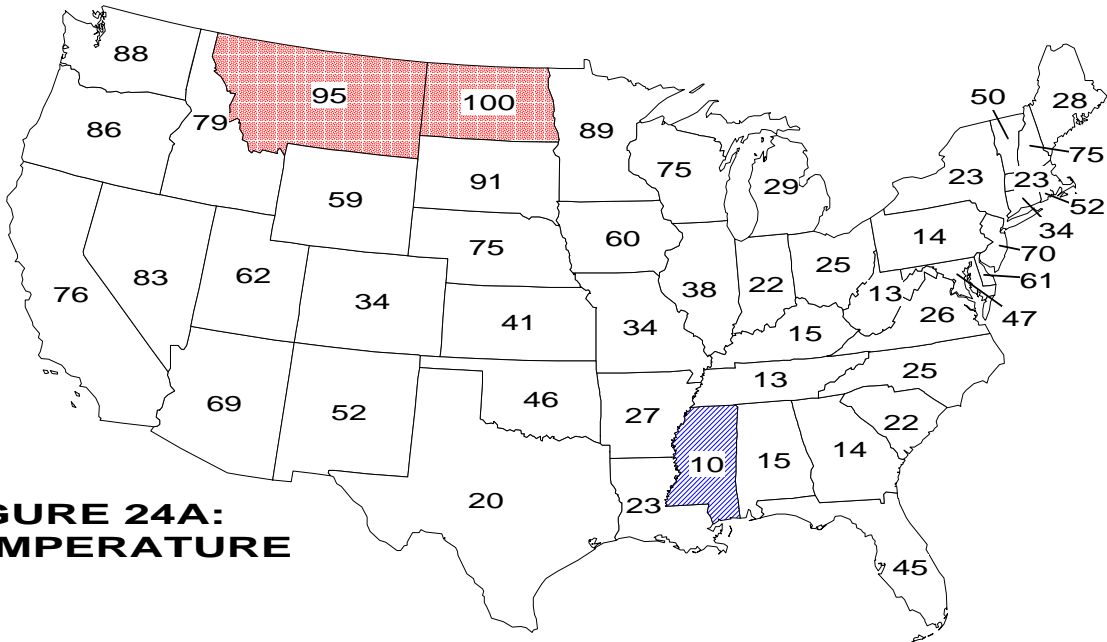
**FIGURE 23B:
PRECIPITATION**

1 = Coldest/Driest
103 = Warmest/Wettest

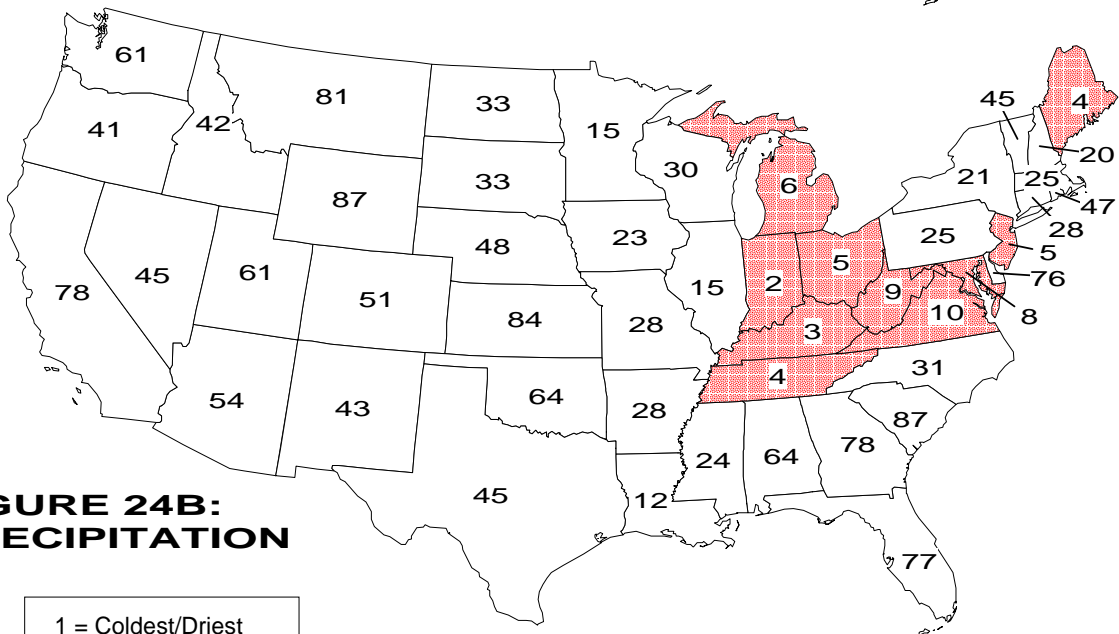
National Climatic Data Center, NOAA

Temperature and Precipitation Ranks for the contiguous United States. Each state is ranked based on its data from 1895-1997. States having a rank of top ten coldest or driest (rank 1-10) or top ten warmest or wettest (rank 94-103) are shaded.

JUL-DEC 1997 STATEWIDE RANKS



**FIGURE 24A:
TEMPERATURE**



**FIGURE 24B:
PRECIPITATION**

1 = Coldest/Driest
103 = Warmest/Wettest

National Climatic Data Center, NOAA

Temperature and Precipitation Ranks for the contiguous United States. Each state is ranked based on its data from 1895-1997. States having a rank of top ten coldest or driest (rank 1-10) or top ten warmest or wettest (rank 94-103) are shaded.

The maps show the 1997 temperature and precipitation ranks for the 48 contiguous states. The December 1997 ranks are shown in Figures **21A** (temperature) and **21B** (precipitation). Four states ranked within the top-ten warm category including the second warmest December on record for North Dakota. It was the fourth warmest December since 1895 for Minnesota and South Dakota and the tenth warmest December since 1895 for Wisconsin. Nine other states ranked within the warm-third of the historical distribution for December 1997. No states ranked within the top-ten cool portion of the distribution while only eight, located mostly in the Southeast and Southwest, ranked within the cool-third of the historical distribution.

Slightly drier than normal conditions characterized December 1997, with eight states ranking in the top-ten driest category including the third driest December on record for New Hampshire and the fourth driest December on record for Maine. December 1997 was the sixth driest such month since 1895 for Minnesota, North Dakota and South Dakota. Twenty-three other states ranked within the dry-third of the historical distribution. It was the fifth wettest December since records began for Florida and the tenth wettest December for Kansas. Seven other states ranked within the wet-third of the historical distribution. ***It should be noted that these December state categorical precipitation ranks are preliminary and should be used with considerable caution due to the high variability of precipitation on a small space and time scale.***

For January through December 1997, slightly wetter and warmer than normal conditions prevailed. Figure **22A** shows the 1997 annual statewide temperature ranks for the 48 contiguous states. A warm pattern in the west, where two states ranked in the top-ten warmest category, and a cooler pattern east of the Rockies was the dominate feature. This pattern reflects an upper-level (Jet Stream) circulation that was dominated (during most months from January-December) by a warm ridge in the west and a cooler trough in the east.

Figure **22B** graphically shows annual precipitation rankings for the 48 contiguous states for 1997. No state ranked within the top-ten wet portion of the historical distribution while fourteen ranked in the wet-third portion of the distribution. Four states, all in the mid-Atlantic and New England region, ranked in the top-ten dry portion of the distribution. Based on preliminary data, it was the fifth driest year on record for Maryland, seventh driest for New Jersey, eighth driest for Maine, and the ninth driest year on record for Virginia. The statewide ranks are highly dependent on the number of stations in the state. Thus, one or two highly anomalous station values are more likely to affect the ranks of the smaller states than the larger states.

A couple of interesting patterns emerge when the January through June period is compared with the July through December period for both 1997 temperature and precipitation (Figures **23A**, **23B**, **24A**, and **24B**). Both six-month periods showed warmth in the west and cooler temperatures in the east. During the January through June period, the much warmer than normal temperatures were concentrated along the Pacific Coast while during the July through December period, the warmer ranks were found in the northern Rockies and the northern Great Plains. The eastern half of the country was cool during the entire year with the coolest rankings occurring in the second half. Precipitation was much more polarized. During the first half of the year, extreme wetness was noted in the South, the lower Mississippi valley and the Ohio valley while dryness was confined to portions of the northern and central Plains and mid-Atlantic region. For the July through December period, the only large-scale wetness noted was moderate conditions along the immediate Southeast coast, the northern Rockies, and California. Extreme dry conditions prevailed in the Ohio valley region, lower Great Lakes region, and portions of the mid-Atlantic and New England.

It should be emphasized that all of the temperature and precipitation ranks on these maps and in the tables are based on preliminary data. The ranks will change when the final data are processed.

MEAN TEMP. ANOMALY (C) DEC. 1997

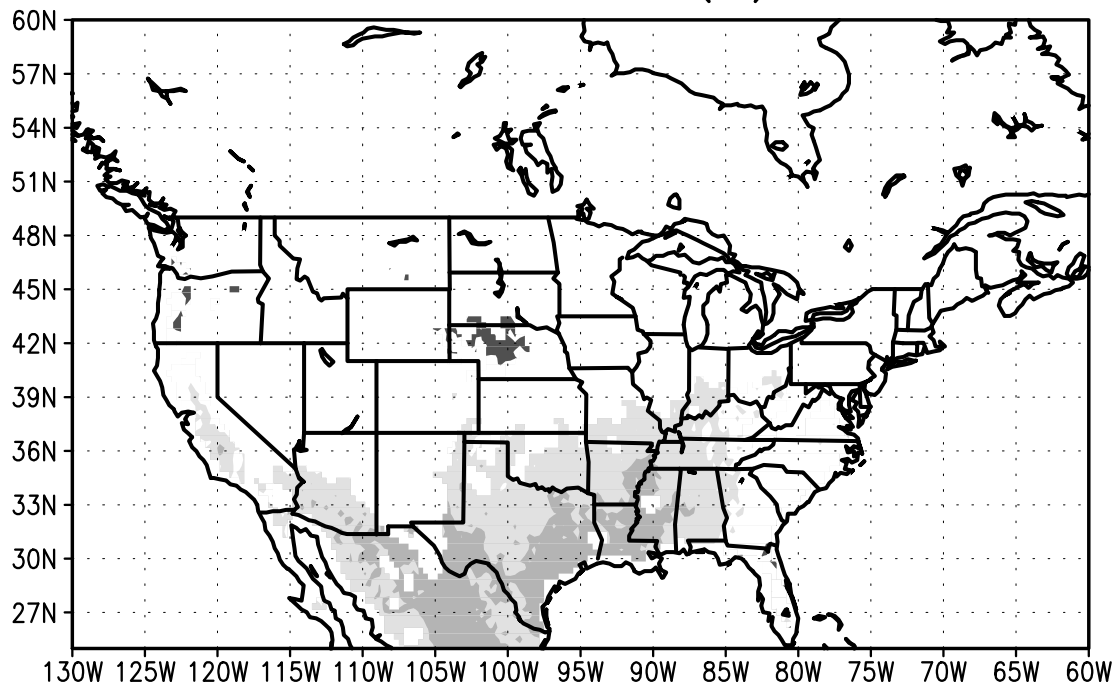


Figure 25

SNOW COVER ANOMALY (%) DEC. 1997

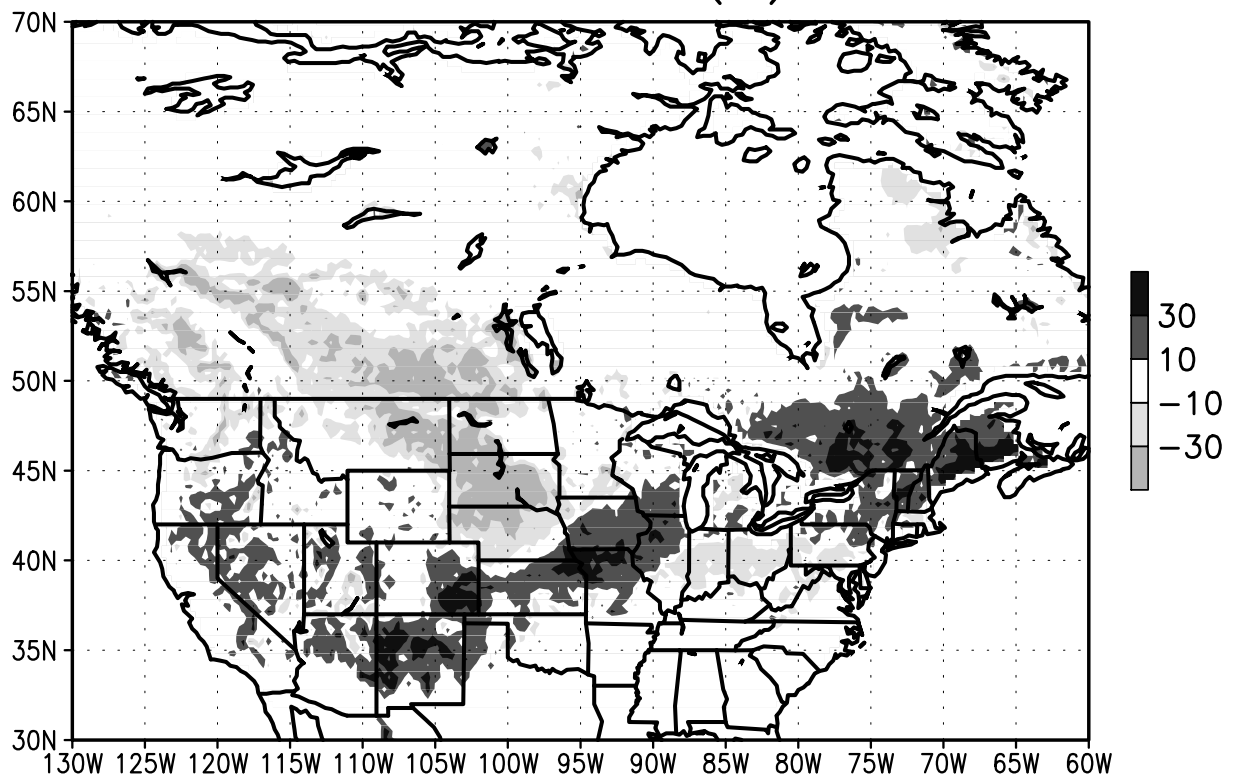


Figure 26

SURFACE WETNESS ANOM. (%) DEC. 1997

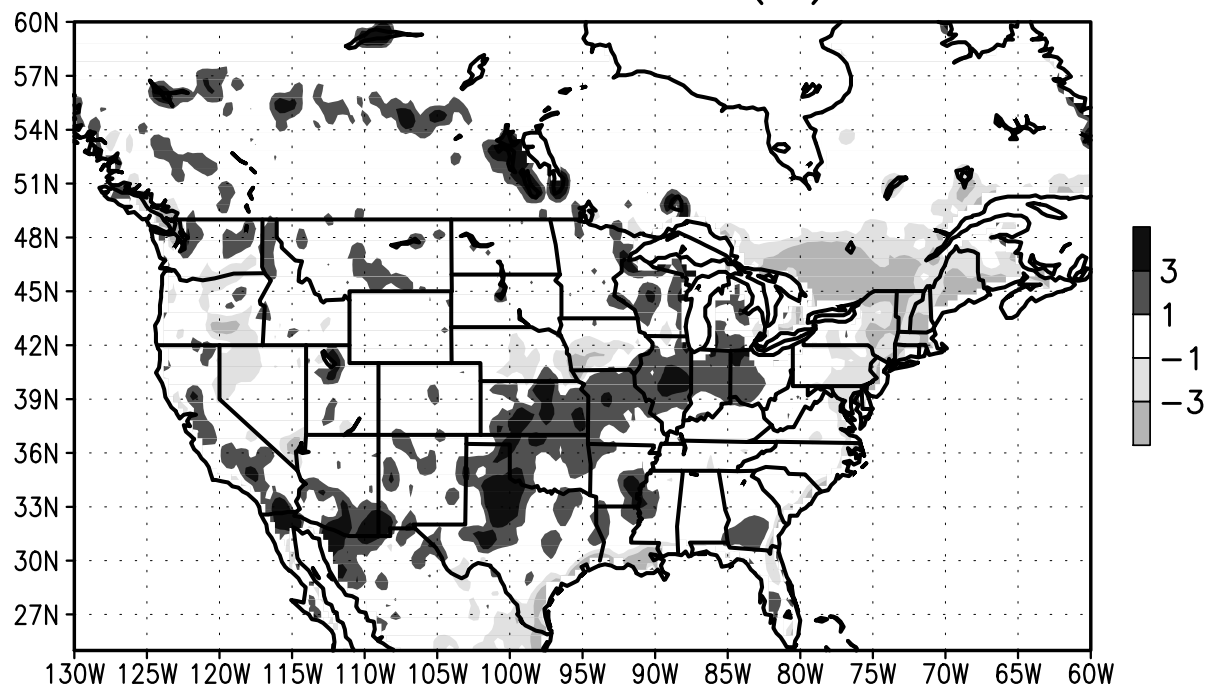


Figure 27

Figure **25** shows the monthly mean temperature anomalies for December 1997. The base period is six years (1992-1997). This experimental product is derived from the Special Sensor Microwave Imager (SSM/I), an instrument flown on a polar orbiting satellite of the defense meteorological satellite program. The anomalies are in degrees Celsius. Snow covered surfaces are set to missing. Below normal temperatures over the south-central states persisted throughout much of the month. The above normal temperatures over the northern Plains are not evident in the anomaly field, since this area is usually covered with snow. The full temperature field can be observed on the web at: <http://www.ncdc.noaa.gov/plwebapps/plsql/ssm/main>. It shows above freezing temperatures extending well into central Canada, east of the Rocky Mountains.

Figure **26** shows mean monthly snow cover anomalies for December 1997. Values represent the deviation from average (base period 1992-1997) snow cover and the anomaly is denoted as a percentage difference from that monthly average. This product is derived from the SSM/I. Much of the U.S. northern Plains and the Canadian southern Plains had below normal snow cover, which corresponded with the above normal temperatures and below normal precipitation during December. In contrast, New England stayed persistently cold and their snow cover lingered throughout the majority of the month. A swath of snow over the central United States was on the ground from late November, and it melted away during the middle of December. The melting of this early snow pack produced high wetness values (see Figure 27) over the area.

Figure **27** shows the mean monthly surface wetness anomalies for December 1997. This experimental product observes water on the surface, and is also derived from the SSM/I instrument. The wetness signature can be attributed to recent rain and melting snow over the central U.S., with the highest value over western Texas corresponding to heavy and persistent rain. The low wetness values over New England corresponds with their snow pack remaining in a frozen state throughout most of December. The low values over the northern Plains correspond with extremely dry conditions during the month.

GULF COAST REGION PRECIPITATION JAN-DEC 1997

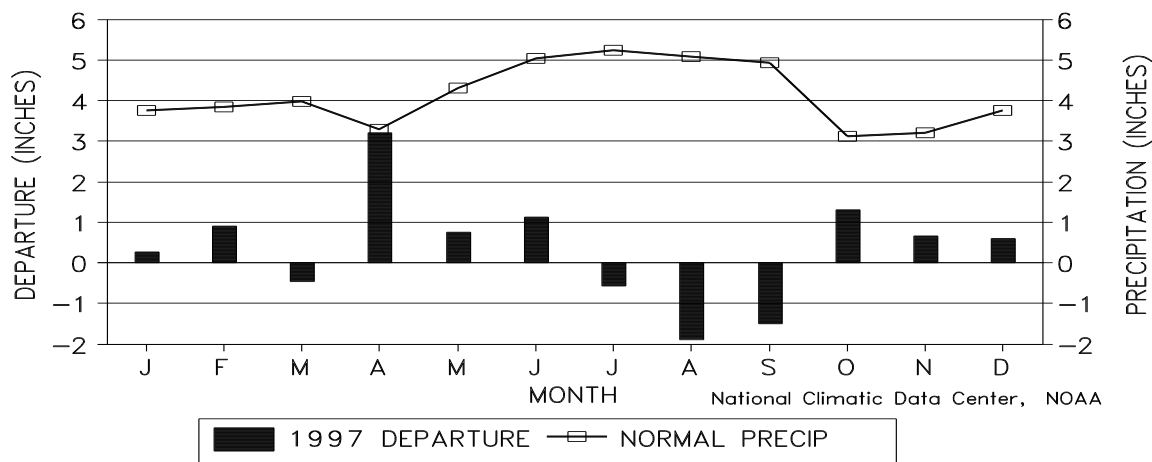


Figure 28. Precipitation along the U.S. Gulf coast was above the 1961–1990 normal during the last 3 months of 1997, consistent with NOAA studies of El Nino.

GULF COAST REGION PRECIPITATION OCT-DEC, 1895–1997

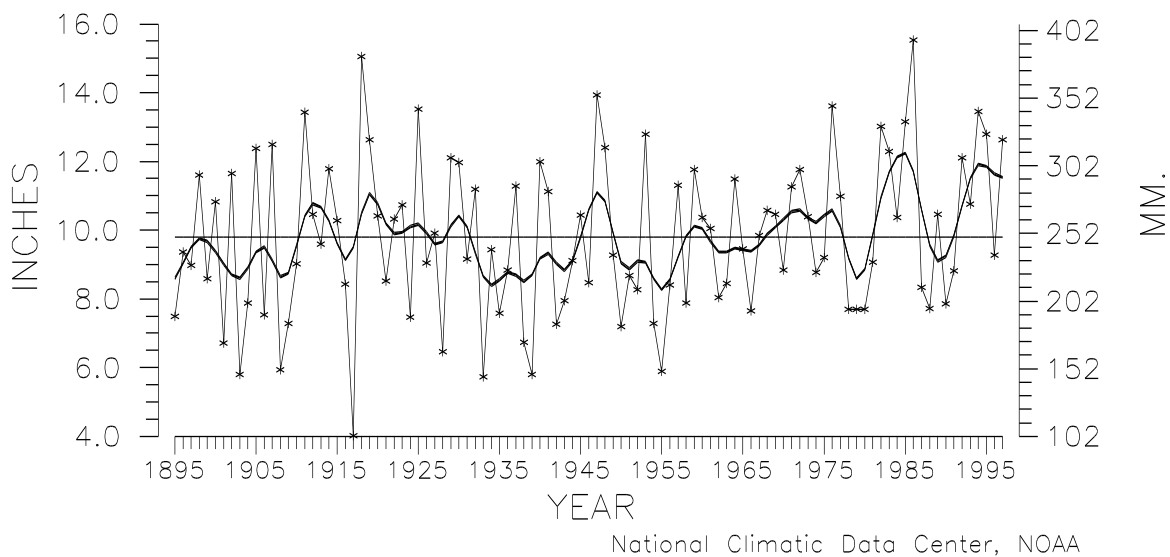


Figure 29: Precipitation for the Gulf Coastal Region was above normal for the three-month period, October through December 1997. Five of the last six such periods have been above- to much above the long-term mean. This above normal anomaly supports NOAA studies on increased precipitation amounts in this region during El Nino episodes.